

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 09 March 1999 (09.03.99)	
International application No. PCT/US98/14196	Applicant's or agent's file reference F123222
International filing date (day/month/year) 15 July 1998 (15.07.98)	Priority date (day/month/year) 15 July 1997 (15.07.97)
Applicant AGARWAL, Anil, K.	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
05 February 1999 (05.02.99)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Diana Nissen

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 09 NOV 1999

WIPO PCT

Applicant's or agent's file reference F123222	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US98/14196	International filing date (day/month/year) 15 JULY 1998	Priority date (day/month/year) 15 JULY 1997
International Patent Classification (IPC) or national classification and IPC IPC(6): H04J 3/26; H04L 12/56, 12/66 and US Cl.: 370/338, 349, 395, 471, 474, 477		
Applicant COMSAT CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets.
- ☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☒ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 05 FEBRUARY 1999	Date of completion of this report 29 OCTOBER 1999
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer ALPUS H. HSU <i>for Ruymin Zou</i>
Facsimile No. (703) 305-3230	Telephone No. (703) 305-4377

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US98/14196

I. Basis of the report

1. This report has been drawn on the basis of *(Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments):*

- ☐ the international application as originally filed.
- ☒ the description, pages (See Attached) , as originally filed.
pages _____ , filed with the demand.
pages _____ , filed with the letter of _____
pages _____ , filed with the letter of _____
- ☒ the claims, Nos. (See Attached) , as originally filed.
Nos. _____ , as amended under Article 19.
Nos. _____ , filed with the demand.
Nos. _____ , filed with the letter of _____
Nos. _____ , filed with the letter of _____
- ☒ the drawings, sheets/fig (See Attached) , as originally filed.
sheets/fig _____ , filed with the demand.
sheets/fig _____ , filed with the letter of _____
sheets/fig _____ , filed with the letter of _____

2. The amendments have resulted in the cancellation of:

- ☒ the description, pages NONE
- ☒ the claims, Nos. NONE
- ☒ the drawings, sheets/fig NONE

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the ~~Supplemental Box~~ Additional observations below (Rule 70.2(c)).

4. Additional observations, if necessary:

NONE

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

- ☐ restricted the claims.
- ☒ paid additional fees.
- ☐ paid additional fees under protest.
- ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
- ☒ not complied with for the following reasons:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-9, 17-39, drawn to a method and apparatus for communicating cells/packets in satellite/wireless communication system.

Group II, claim(s) 10-16, drawn to a signal frame format arrangement.

The inventions listed as Groups I and II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Groups I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP 806.05(c)). In this instant case, the combination as claimed does not require the particulars of the subcombination as claimed and the subcombination has utility by itself such as a data formatting device.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☒ all parts.
- ☐ the parts relating to claims Nos. . . .

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US98/14196

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. STATEMENT**

Novelty (N)	Claims	<u>1-9, 14-39</u>	YES
	Claims	<u>10-13</u>	NO
Inventive Step (IS)	Claims	<u>1-9, 17-39</u>	YES
	Claims	<u>10-16</u>	NO
Industrial Applicability (IA)	Claims	<u>1-39</u>	YES
	Claims	<u>NONE</u>	NO

2. CITATIONS AND EXPLANATIONS

Claims 10-13 lack novelty under PCT Article 33(2) as being anticipated by U.S. Patent No. 5,446,736 to Gleeson et al.. Gleeson et al. discloses a method and apparatus for transmitting information in a plurality of cells/packets for a satellite/wireless communication system providing frame assembly/disassembly and header compression/decompression and a cell/packet signal frame arrangement as in claims 10-13 (see col. 6, lines 4-56, col. 13, line 23 to col. 16, line 20, Figures 1, 12A and 14A).

Claims 10-13 lack novelty under PCT Article 33(2) as being anticipated by U.S. Patent No. 5,579,316 to Venters et al.. Venters et al. discloses a cell/packet signal frame arrangement as in claims 10-13 (see col. 4, line 18 to col. 5, line 37, col. 6, line 50 to col. 8, line 54).

Claims 14-16 lack an inventive step under PCT Article 33(3) as being obvious over U.S. Patent No. 5,446,736 to Gleeson et al.. in view of U.S. Patent No. 5,490,141 to Lai et al. or U.S. Patent No. 5,490,140 to Abensour et al.. Gleeson et al. fails to disclose the feature of having cell/packets comprise ATM cells or frame relay packets or Internet packets as in claims 14-16, which are all well known data format and commonly used in communication field for data communication purpose. Lai et al., for example, from the similar field of endeavor, provides the teaching of these well known data format (col. 3, line 52 to col. 5, line 52, col. 8, line 50 to col. 10, line 16) as claimed. Similarly, Abensour et al. also provides the teaching of these well known data format (col. 3, line 14 to col. 5, line 15, col. 7, line 46 to col. 9, line 40) as claimed.

Claims 14-16 lack an inventive step under PCT Article 33(3) as being obvious over U.S. Patent No. 5,579,316 to Venters et al. in view of U.S. Patent No. 5,490,141 to Lai et al. or U.S. Patent No. 5,490,140 to Abensour et al.. Venters et al. also fails to disclose the feature of having cell/packets comprise ATM cells or frame relay packets or Internet packets as in claims 14-16, which are all well known data format and commonly used in (Continued on Supplemental Sheet.)

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 10

I. BASIS OF REPORT:

This report has been drawn on the basis of the description,
pages, 1-32, as originally filed.
pages, NONE, filed with the demand.
and additional amendments:
NONE

This report has been drawn on the basis of the claims,
numbers, NONE, as originally filed.
numbers, NONE, as amended under Article 19.
numbers, NONE, filed with the demand.
and additional amendments:
Claims 1-39, filed with the letter of 10 August 1999.

This report has been drawn on the basis of the drawings,
sheets, 1-14, as originally filed.
sheets, NONE, filed with the demand.
and additional amendments:
NONE

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):

communications field for data communication purpose. Lai et al., for example, from the similar field of endeavor, provides the teaching of these well known data format (col. 3, line 52 to col. 5, line 52, col. 8, line 50 to col. 10, line 16) as claimed. Similarly, Abensour et al. also provides the teaching of these well known data format (col. 3, line 14 to col. 5, line 15, col. 7, line 46 to col. 9, line 40) as claimed.

Claims 1-9, 17-39 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest a method and apparatus for transmitting information in plural cells/packets using header compression and decompression algorithms in combination with look-up tables that permit rapid correlation and readout of compressed headers and decompressed headers.

----- NEW CITATIONS -----
NONE

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/14196**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) :H04J 3/26; H04L 12/56, 12/66

US CL :370/338, 349, 395, 471, 474, 477

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 370/338, 349, 389, 395, 396, 400, 401, 468, 470, 471, 473, 474, 477; 371/37.01, 37.7

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS search terms: frame#, (cell# or packet#), header, payload, compress?, atm, frame relay, internet, assembl?, disassembl?, switch?, interface, lan, encod?, interleav?

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	US 5,717,689 A (AYANOGLU) 10 February 1998 (10.02.98), see col. 19, line 19 to col. 22, line 22.	1-39
X	US 5,446,736 A (GLEESON et al.) 29 August 1995 (29.08.95), see col. 6, lines 4-56, col. 13, line 23 to col. 16, line 20, Figures 1, 12A and 14A.	1-6, 10-13, 17-19, 23-25, 27, 35-39
---		7-9, 14-16, 20-22, 26, 28-34
Y		
X	US 5,579,316 A (VENTERS et al.) 26 November 1996 (26.11.96), see col. 4, line 18 to col. 5, line 37, col. 6, line 50 to col. 8, line 54.	10-13
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Y		14-16

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*-&* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

28 OCTOBER 1998

Date of mailing of the international search report

11 DEC 1998

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ALPUS H. HSU

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/14196

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,490,141 A (LAI et al.) 06 February 1996 (06.02.96), see col. 3, line 52 to col. 5, line 52; col. 8, line 50 to col. 10, line 16.	7-9, 14-16, 20-22, 26
Y	US 5,490,140 A (ABENSOUR et al.) 06 February 1996 (06.02.96), see col. 3, line 14 to col. 5, line 15, col. 7, line 46 to col. 9, line 40.	7-9, 14-16, 20-22, 26
A	US 5,570,362 A (NISHIMURA) 29 October 1996 (29.10.96), see col. 6, line 32 to col. 7, line 49.	1-39

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/14196

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐
☐

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-9, 17-39, drawn to a method and apparatus for communicating cells/packets in satellite/wireless communication system.

Group II, claim(s) 10-16, drawn to a signal frame format arrangement.

The inventions listed as Groups I and II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Groups I and II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP 806.05(c)). In this instant case, the combination as claimed does not require the particulars of the subcombination as claimed and the subcombination has utility by itself such as a data formatting device.

What is claimed is:

1. A communication system for efficiently transmitting information signals in discrete cell/packets, said system comprising at least two local area networks that are connected by a wireless communication link, each local area network comprising:

5 (a) a switch for providing a plurality of cell/packets, each cell/packet comprising a header and a payload;

(b) an interface for connecting said switch to said wireless communication link, said interface comprising:

10 (i) means for discriminating each cell/packet in said plurality of cell/packets;

(ii) means for detecting a header in each of said cell/packets and for separating said header from payload;

(iii) means for compressing said separated header; and

15 (iv) means for combining said compressed header with said payload to form compressed header cells;

(c) a frame assembler for assembling said compressed header cells into a frame; and

(d) means for transmitting said assembled frame.

2. A communication system as set forth in claim 1 further comprising encoding means for encoding said assembled frame.

3. A communication system as set forth in claim 1 further comprising an interleaver for interleaving a plurality of said assembled frames.

4. A communication system as set forth in claim 1 further comprising an interface to the wireless communication link.

20 5. A communication system as set forth in claim 1 further comprising:

(e) means for receiving said transmitted frames from said wireless communication link; and

(f) a frame disassembler for disassembling said frames into a plurality of compressed header cell/packets.

6. A communication system as set forth in claim 5, wherein said interface further comprises:

(v) means for discriminating each compressed header cell in said plurality of compressed header cells;

5 (vi) means for detecting a header in each of said compressed header cells and for separating said header from payload;

(vii) means for decompressing said separated header; and

(viii) means for combining said decompressed header with said payload to form cell/packets.

10 7. A communication system as set forth in claim 5, wherein said cell/packets comprise ATM cells.

8. A communication system as set forth in claim 5, wherein said cell/packets comprise frame relay packets.

9. A communication system as set forth in claim 5, wherein said cell/packets comprise Internet packets.

10. An arrangement of signals in a cell/packet frame with compressed header comprising:

a first number of bytes representing an original header portion comprising a second number of bytes, said first number being less than than said second number; and

5 a payload portion.

11. The arrangement of signals in a cell/packet frame as set forth in claim 10 wherein said compressed header is a predetermined size for all cell/packets.

12. The arrangement of signals in a cell/packet frame as set forth in claim 10 wherein said first number comprises two octets and said second number comprises four octets.

13. The arrangement of signals in a cell/packet frame as set forth in claim 10 wherein said first number comprises at least one octet and said second number comprises at least two octets.

14. The arrangement of signals in a cell/packet frame as set forth in claim 10 wherein said cell/packets comprise ATM cells.

15. The arrangement of signals in a cell/packet frame as set forth in claim 10 wherein said cell/packets comprise frame relay packets. and Internet packets.

16. The arrangement of signals in a cell/packet frame as set forth in claim 10 wherein said cell/packets comprise Internet packets.

17. An apparatus for a satellite/wireless communication system for transmitting information in a plurality of cell/packets, said apparatus comprising:

(i) means for discriminating each cell/packet in said plurality of cell/packets;

5 (ii) means for detecting a header in each of said cell/packets and for separating said header from payload;

(iii) means for compressing said separated header; and

(iv) means for combining said compressed header with said payload to form compressed header cell/packets;

10 (v) means for discriminating each compressed header cell/packet in said plurality of compressed header cell/packets;

(vi) means for detecting a header in each of said compressed header cell/packets and for separating said header from payload;

(vii) means for decompressing said separated header; and

15 (viii) means for combining said decompressed header with said payload to form cell/packets.

18. An apparatus for a satellite/wireless communication system as set forth in claim 17, wherein said means for compressing and said means for decompressing comprises means for correlating original header and transmitted compressed header information.

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19. An apparatus for a satellite/wireless communication system as set forth in claim 18, said apparatus further comprising means for transmitting from a transmitting location, comprising means (i)-(iv) to a receiving location comprising means (v)-(viii) information for correlating original header and transmitted header information.

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20. A communication system as set forth in claim 17, wherein said cell/packets comprise ATM cells.

21. A communication system as set forth in claim 17, wherein said cell/packets comprise frame relay packets.

22. A communication system as set forth in claim 17, wherein said cell/packets comprise at least one of ATM cells and frame relay packets.

23. An apparatus for an frame relay wireless communication system, said apparatus comprising:

(i) means for generating a one or more Spackets for each frame relay packet cell used for conveying payload information;

(ii) means for detecting a header in each of said Spackets and for separating said header from payload;

(iii) means for compressing said separated header; and

(iv) means for combining said compressed header with said payload to form compressed header cells;

(v) means for discriminating each compressed header cell in said plurality of compressed header cells;

(vi) means for detecting a header in each of said compressed header cells and for separating said header from payload;

- 15 (vii) means for decompressing said separated header; and
(viii) means for combining said decompressed header with said
payload to form Spackets.

24. An apparatus for a frame relay wireless communication system as set forth in claim 23, wherein said means for compressing and said means for decompressing comprises means for correlating original header and transmitted compressed header information.

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25. An apparatus for a frame relay wireless communication system as set forth in claim 23, said apparatus further comprising means for transmitting from a transmitting location, comprising means (i)-(iv) to a receiving location comprising means (v)-(viii) information for correlating original header and transmitted header
5 information.

26. An apparatus for a frame relay wireless communication system as set forth in claim 23, further comprising means for assembling a plurality of Spackets into a frame relay packet.

27. A method of communicating cell/packets, each comprising a header portion and a payload portion, in a modified frame format comprising:

(a) separating said header portion and said payload portion for each cell/packet:

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- (b) identifying N of M header octets in said header;
(c) compressing said N header octets into L octets;
(d) combining said L octets with said payload portion;
(e) transmitting said combined L octets and payload portion within a frame;
(f) receiving said frame;
10 (g) separating said L octets from said payload;
(h) decompressing said L octets into N header octets;
(i) generating M header octets from said N header octets; and
(j) combining said M header octets with said payload portion to create a

cell/packet.

28. The method of claim 27 wherein said compressing step further comprises:

comparing said N header octets to the content of a header compression table containing index values.

29. The method of claim 27 wherein said comparing step comprises at least one of hashing and table look-up techniques.

30. The method of claim 27 wherein said decompressing step further comprises:

comparing said L octets to the content of a header decompression table containing N header octets.

31. The method of claim 30 wherein said comparing step comprises at least one of hashing and table look-up techniques.

32. The method of claim 24 wherein said header comprises a HEC-based header.

33. The method of claim 27 wherein said header decompression table has H-1 entries, wherein $H = 2n$, wherein $n \leq 16$.

34. The method as recited in claim 27 wherein said transmission step further comprises generating an input entry for a compression table and generating an entry for a decompression table and transmitting said decompression table entry for input into said decompression table.

35. The method as recited in claim 34 wherein said entry is transmitted in a cell.

36. The method as recited in claim 35 wherein said entry is created and sent ahead of a user cell.

37. An apparatus for an Internet satellite/wireless communication system, said apparatus comprising:

(i) a generator for generating a one or more Internet cell/packets for conveying payload information;

5 (ii) a header detector operable to detect a header in each of said packets and for separating said header from payload;

(iii) a compressor for compressing said separated header; and

(iv) a combining unit for combining said compressed header with said payload to form compressed header cell/packets;

10 (v) a discriminator for discriminating each compressed header cell in said plurality of compressed header cell/packets;

(vi) a header detector for detecting a header in each of said compressed header cell/packets and for separating said header from payload;

(vii) a decompressor for decompressing said separated header; and

15 (viii) a combining unit for combining said decompressed header with said payload to form packets.

38. An apparatus for a frame relay wireless communication system as set forth in claim 37, wherein said compressor and said decompressor comprises means for correlating original header and transmitted compressed header information.

39. An apparatus for a frame relay wireless communication system as set forth in claim 37, said apparatus further comprising means for transmitting from a transmitting location, comprising apparatus (i)-(iv) to a receiving location comprising apparatus (v)-(viii) information for correlating original header and transmitted header
5 information.